GEOLOGY AND PALEONTOLOGY.

The Moon's Face.—Mr. Gilbert's address as retiring president of the Washington Philosophical Society is an ingenious array of arguments in favor of the impact theory to account for the origin of the features of the moon's face. His hypothesis is, that material constituting the moon once surrounded the earth in the form of a Saturnian ring; that the small bodies of this ring coalesced, first gathering around a large number of nuclei, and finally all uniting in a single sphere, the moon; that the lunar craters are the scars resulting from the collision of the moonlets.

This hypothesis reconciles the impact theory with the circular outline of the lunar craters, and explains the abundance of colliding bodies of large magnitude. The author discusses the probabilities of the formation, according to his theory, of lunar wreaths, central hills, arched inner plains, level inner plains, and the association of inner plains with central hills. He finds his theory adequate to explain all these phenomena, as well as the peculiarities known as furrows, sculpture, rills and rill pits. In regard to the "white streaks" Mr. Gilbert quotes, as in accordance with his own idea, an unpublished suggestion made by Mr. William Würdeman, "that a meteorite (moonlet) striking the moon with great force spattered whitish matter in various directions."

During the growth of the moon, many of the moonlets must have collided with the earth and formed impact craters which have been obliterated by erosion and sedimentation. It is possible the writer suggests, that these collisions imitated not only the differentiation of continental and oceanic plateaus, but the series of geographic transformations of which geologic structure is the record. (Phil. Soc. Washington, Bull. Vol. XII, 1893).

North America during Cambrian Time.—Mr. Charles Walcott's extensive knowledge of the Cambrian system of North America, has made it possible for him to reconstruct the form of the continent during that time. The land area is considered at the inception of Cambrian time, and its history is traced in a broad manner to the closing epoch of the period.

By a form of deductive reasoning from the mode of sedimentation the author first determines an approximate shore line of the ancient

pre-Cambrian continent. The geographic distribution of pre-Cambrian land is based upon the evidence afforded by the absence of Cambrian deposits upon known pre-Cambrian rocks; the existence of shore lines during earlier Cambrian time; and the presence of deep-water deposits. The features of the surface of the pre-Cambrian land are indicated by the relation of the known Cambrian and post-Cambrian formations where it is exposed.

Mr. Walcott considers the prevailing view of the geographic distribution and extent of continental area at the beginning of Paleozoic time too restricted. The present Appalachian system was outlined by a broad, high range that extended from the present site of Alabama to Canada, with subparallel ranges to the east and northeast. The paleo-Adirondacks joined the main portion of the continent, and the strait between them and the paleo-Green Mountains opened north into the paleo-St. Lawrence Gulf, and to the south extended far along the western side of the mountains and the eastern margin of the continental mass to the sea that carried the fauna of the Olenellus epoch around to the paleo-Rocky Mountain trough.

It is highly probable that ridges of the Algonkian Continent rose above the sea to the east of the present continent. On the east and west of the continental area the pre-Cambrian land formed a mountain region, and over the interior a plateau existed much as it does to-day.

In late Middle Cambrian time, the Cambrian Sea began to invade the great Interior Continental area and extended far to the north toward the close of the period.

At the close of the Cambrian time the Cambrian Sea had extended over the broad interior continent and had submerged the low ground along the line of the barrier ridges and some portions of the northern nucleal V of the Archean Continent.

Two hypothetical maps based upon columnar sections, and the present knowledge of the distribution of the sediments, represent the continent at the beginning of Lower Cambrian and of Ordovician time. These maps in connection with one showing the relative amount of sedimentation within the typical provinces of North America during Cambrian time, and the theoretic sections across the continent, are valuable adjuncts to the text. (Extr. Twelfth Ann. Rept. Director U. S. Geol. Survey, 1890–91).

Lower Silurian Brachiopoda of Minnesota.—The report of Mr. N. H. Winchell and Mr. Charles Schubert on the Brachiopoda found in the Lower Silurian deposits of Minnesota comprises descrip-

tions of 31 genera and subgenera, to which are referred 94 species and varieties. These latter include 15 that are new to science. Two new families are necessitated by the authors' scheme of classification. Clitambonitidæ to contain Protorthis, Clitambonites, Hemipronites, and Scenidium; and Lingulasmatidæ to contain Lingulaps and Lingulasma.

In a short introduction the authors state that near the top of the Trenton shales new forms are introduced. Near the middle of the Galena the brachiopod horizon is quite distinct from any below it. The fauna of the Hudson River deposits agrees with that of the Cincinnati group of the Ohio Valley. Below the Trenton limestone, but one brachiopod (*Lingula moesii*) is known in the St. Peter sandstone; none in the Shakopee formation, but several in the Lower Magnesian. In the St. Croix formation brachiopods are abundant but mainly of inarticulate species. (Extr. Vol. III. Rept. Minn. Geol. Surv. 1893)

Geological News. General.—Mr. C. S. Du Riche Preller gives as a result of a lengthy investigation of the Tuscan Archipelago that (1) these islands are, geologically and petrographically, closely connected, not only with each other, but with the Maremina Hills on the one hand, and with Corsica and Sardinia, as well as with the Ligurian Alps on the other; (2) that they probably constitute part of a former Tyrrhenian continent; and (3) with few exceptions they are representative of every geological formation from pre-Silurian downward and also include an interesting eruptive series. (Geol. Mag., June, 1893).

Paleozoic.—Mr. N. H. Winchell and C. Schubert have published in quarto form, with profuse illustration, the Sponges, Graptolites and Corals from the Lower Silurian of Minnesota. 9 sponges are listed; 4 Hydrozoa including the doubtful one, *Solenopora compacta* Billings; and 10 Actinozoa, of which 5 are new species. The paper includes a discussion of the systematic position of "Anomaloides" by Mr. E. O. Ulrich, with a proposal to change the name to Anomalospongia. (Vol. III. Final Rept. Minn. Geol. Surv. 1893).

A new species of Discites (*Discites hibernicus*) is described and figured by Messrs A. H. Foord and G. C. Cricks in the Geol. Mag., June, 1893. The shell has not been distorted during fossilization, so that the characters of the fossil can be accurately determined. The specimen was found in the carboniferous limestone near Dublin.

According to Mr. Arthur Hollick the isolated and limited exposures of cretaceous strata on Staten Island indicate a large and continuous bed of similar material throughout the entire area. Mr. White's division of the New Jersey cretaceous strata into marine and non-marine, with the Staten Island Clays referred to the latter division, the author considers no longer tenable. (Trans. N. Y. Acad. Sci. Vol. XI, 1892).

Mesozoic.—The validity of the Wallala beds as a division of the California cretaceous is questioned by Mr. H. W. Fairbanks. This division was made by Drs. White and Becker and comprises a series of shales, sandstones and conglomerates found in Mendocino Co., Cal. and Todos Santos Bay, Lower Cal. The Coraliochama, which White considers the characteristic fossil of the Wallala beds, is abundant in the Chico. Recent fossil finds show also that the fauna of Todos Santos Bay closely resembles the Chico. The general character of to the beds, together with resemblance of fauna, is sufficient evidence Mr. Fairbanks that the Wallala beds and the Chico are synchronous. (Am. Journ. of Sci., June, 1893.

Mr. T. W. Stanton's conclusions in regard to the California cretaceous are substantially the same as those of Mr. Diller. He finds no faunal break in the series of strata that have been referred to. the Shasta and Chico formations. A comparison of the Shasta-Chico fauna with that of the Blackdown beds of England, shows that of 46 species figured by Sowerby from those beds, 23 are represented in the Shasta-Chico formations. The age of this fauna, therefore, is not more recent than the Cenomanian. (Bull. Geol. Soc. Am. June, 1893).

Cenozoic.—In discussing the affinities of a fish from the " terrain Bruxellien " described by Dr. Winkler as *Euchodus bleekeri*, M. Raymond Storms agrees with Mr. A. S. Woodward, that the fossil must be referred to Cybium, a genus represented in modern waters by at least a dozen species. (Bull. Soc. Belge de Geol. de Paleont. et d' Hydrol, T. VI, 1892).—At the June meeting of the London Zoological Society an account was given by Mr. Lydekker of a collection of bird bones from the Neocene deposits of St. Alban in the Department of Isère, France. The more perfect specimens were referred mostly to new species; *Strix sancti albani*, *Palaeortyx maxima*, *P. grivensis* and *Totanus majori*. Some of the specimens were indeterminable from their fragmentary condition. (Nature, June 15, 1893.)